UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/369,767	08/06/99	NEUMANN H	10191/1146

026646
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IM52/1031

EXAMINER	
OLSEN, K	
ART UNIT	**PAPER NUMBER**
1744	15

DATE MAILED: 10/31/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/369,767	Applicant(s) NEUMANN, HARALD	
	Examiner Kaj Olsen	Art Unit 1744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 August 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

In view of the appeal brief filed on 8-8-2001, PROSECUTION IS HEREBY REOPENED. A new grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(a) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(b) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1 and 5-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato (4,909,922) in view of any of Kojima et al (4,629,549), Nakajima et al (4,787,966), Ohyama (5,203,983), and/or Sone (4,365,604) and with evidence by Logothetis et al ("High-temperature Oxygen Sensors", ACS Symposium Series).

Kato discloses an electrochemical sensor comprising a solid electrolyte element including a first electrode 22, a second electrode 24 in the reference duct 72, and a heating element 36

where the second electrode is situated closer to the heating element than the first electrode (fig. 7). In addition, Kato discloses in the embodiment of fig. 7 coupling the second electrode to the lower potential terminal of the heater element. Fig. 7 also shows the second electrode extending over the width of the reference duct. Although the lower potential element is not specified as being ground, it is conventional in the art to utilize ground as the lower potential element. This is evidenced by the references Sone, Ohyama, Nakajima, and Kojima. These references are a sampling of the myriad of references available showing the conventional use of ground as a negative potential for the heater element. In particular, Sone teaches utilizing the automotive battery as the power source for the sensor components (fig. 4, and col. 8, lines 34-51). Because automotive batteries typically utilize ground as the negative terminal of the battery, it thereby follows that it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize ground as the negative terminal for any components powered by the automotive battery (such as the sensor of Kato) to simplify the electrical construction. The same use of ground as the negative potential of the battery can also be found in Nakajima (fig. 3), Kojima (fig. 2), and Ohyama (fig. 1). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize ground for the negative terminal of the heater as taught by Ohyama, Kojima, Nakajima, or Sone because the ground potential is a convenient lower potential available for a heater resulting in simpler electrical construction. Because it is obvious to ground the second electrode, and the first electrode would be at a lower potential than the second electrode due to the electromotive force (EMF) induced by the difference in oxygen partial pressure between the reference and exhaust gas, said first electrode would inherently be negatively polarized by induced EMF. In other words, when the

oxygen partial pressure exposed to electrode 22 is lower than the oxygen partial pressure exposed to electrode 24, the potential at electrode 22 will be lower than the potential at electrode 24 (i.e. negatively polarized) (see equation 2 and fig. 1 of Logothetis for discussion of EMF).

With respect to the size of the electrodes, both Nakajima and Kojima set forth the use of electrodes which are all the same size. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize electrodes which are the same size because the art already recognized the use of electrodes which are all the same size and such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CCPA 1955).

With respect to the electrolyte material, see (col. 10, lines 39-44). With respect to the heater voltage, the applied voltage is an intended use of the invention. Alternatively, although Kato ('922) does not explicitly specify the heater voltage applied, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize 12 volts since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In addition, because automotive batteries are typically 12 volts, 12 volts is an obvious choice of voltage because it is an already readily available voltage level for the heater. With respect to the limitations calling for the second electrode to "additionally acts as a shield against coupling of heater voltage Uh", this limitation does not positively recite any further structure associated with sensor. Because the references rendered obvious the structure of the claim, this shielding

property is inherent. The heater is also disclosed as being embedded in an electrical insulator (col. 8, lines 25 and 26).

Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato ('922) and Ohyama, Kojima, Nakajima, or Sone in further view of Logothetis et al ("High-temperature Oxygen Sensors", ACS Symposium Series)

Kato disclosed all the limitations of the claims, but did not explicitly recite the use of operating voltages for the electrodes. Kato instead disclosed utilizing the sensor for the measurement of the induced electromotive force. Logothetis discloses that there are a number of advantages to operating the sensor with an induced current (as opposed to relying on the electromotive force), including that the output of the sensor becomes linearly proportional to the oxygen concentration in the gas (fig. 1, 2 and the associated discussion). This allows for wide sensing range (electromotive based sensors are typical only sensitive at a particular air-fuel ratio) and it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teachings of Logothetis for the invention of Kato to provide a sensor giving an output linearly proportional to the measured gas concentration. The teaching of applying a voltage across the electrodes of Kato would result in a negative voltage being applied to the first electrode 22 because Kato already rendered obvious grounding the second electrode which should be at a higher potential than that of first electrode (fig. 2 Logothetis) (hence the potential applied to 22 would be negative).

Claims 1, 7, 8, 10, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stahl et al (4,400,260) in view of Ohyama, Kojima, Nakajima, or Sone and as evidenced by Logothetis.

Stahl discloses an electrochemical sensor which comprises a solid electrolyte element 25 with first and second electrodes (27, 29 respectively), a heating element 30, where the second electrode 29 is situated closer to the heating element that the first electrode (fig. 4 and 5). Stahl also discloses connecting the second electrode 29 to a common element 33 with the negative lead of the heater. Although Stahl never discloses the common element to be at a ground potential, ground is a convenient potential available in the application of these electrochemical sensors (see discussion above with respect to Ohyama, Kojima, Nakajima, or Sone). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Ohyama, Kojima, Nakajima, or Sone with the sensor of Stahl because the prior art recognized the use of ground as a convenient lower potential for the heater. The use of ground as the lower potential for heater also simplifies circuit construction for the reasons set forth above (especially with respect to Sone). With respect to the polarization level of the first electrode, Stahl discloses operating the sensor in potentiometric mode (col.3, lines 11 and 12). In such an application, the polarization of the first electrode will be a function of the difference in oxygen levels in the gas being measured and in the reference passage. If the oxygen were greater in the measured portion than in the reference passage, the first electrode would be inherently negatively polarized (again, see discussion of EMF in Logothetis). Because the claim does not specify an operating condition where the measured gas concentration is less than the reference gas composition, Stahl would inherently meet the polarization limitation when the measured gas is of a greater concentration than the reference gas. The electrolyte of Stahl is zirconia (col. 3, line 13) and the heating element is placed on a protective coating (col. 5, lines 66-67). With respect to the heater voltage, the applied voltage is an intended use of the

invention. Alternatively, although Stahl does not explicitly specify the heater voltage applied, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize 12 volts since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In addition, because automotive batteries are typically 12 volts, 12 volts is an obvious choice of voltage because it is an already readily available voltage level for the heater. With respect to the limitations calling for the second electrode to "additionally acts as a shield against coupling of heater voltage Uh", this limitation does not positively recite any further structure associated with sensor. Because the references rendered obvious the structure of the claim, this shielding property is inherent. The heater is also disclosed as being embedded in an electrical insulator (col. 8, lines 25 and 26).

Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murase et al (5,413,683) in view of Kato (4,909,922).

Murase discloses an electrochemical sensor which comprises a solid electrolyte element 14 which includes a first electrode 32, a second electrode 30. Although not shown in the figures, Murase further discloses the use of a heating means for operating the sensor at elevated temperatures (col. 12, lines 32-35). Murase does not explicitly identify where the heating means would be located on the disclosed sensor, Kato teaches that it is conventional in the art to place the heater below the electrodes at a lower portion of the sensor (fig. 1-7). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Kato for the sensor Murase because placing the heater at the lower portion of the sensor has been identified as being a conventional location for sensor heaters. In this case, the

second electrode 30 would be situated closer to the heating element than the first electrode. In addition, Murase teaches coupling the second electrode to ground while negatively polarizing the first electrode by the application of a negative voltage with respect to ground. The negative voltage provided to the first electrode controls (powers) the measuring circuit (fig. 3 and associated discussion). The first and second electrodes have approximately the same sizes and the second electrode communicates with an atmosphere 16 which would read on the applicants use of the term "reference duct" giving the term it broadest reasonable interpretation. With respect to the atmosphere being a reference atmosphere, the claim has not sufficiently defined the term reference in the claim in a manner which would obviate the examiner from interpreting said atmosphere as being a reference atmosphere.

With respect to the choice of electrolyte, see col. 6, lines 14-15. With respect to the heater voltage, the applied voltage is an intended use of the invention. Alternatively, although Murase does not explicitly specify the heater voltage applied, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize 12 volts since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In addition, because automotive batteries are typically 12 volts, 12 volts is an obvious choice of voltage because it is an already readily available voltage level for the heater. The heater is also disclosed as being embedded in an electrical insulator (col. 8, lines 25 and 26). With respect to the limitations calling for the second electrode to "additionally acts as a shield against coupling of heater voltage Uh", this limitation does not positively recite any further structure associated with sensor. Because the references rendered obvious the structure of the claim, this shielding

property is inherent. Kato taught embedding the heater into an insulating member (see discussion above).

Response to Arguments

Applicant's arguments filed on 8-8-2001 have been fully considered but they are not persuasive. In response to applicant's repeated argument that it would not have been obvious to ground the negative heating electrode of Kato and Stahl, the examiner has included with this office action references evidencing of the widespread use of the grounding of the negative heater element as well as motivation for doing so (in particular Sone). The references shown are only a sampling of the myriad of references available demonstrating this conventional heater electronics construction. Consequently, the examiner considers the applicant's arguments concerning the grounding of the negative terminal of Kato and Stahl moot. The examiner also believes applicant's argument concerning the grounding of the positive electrode (p. 8, lines 7 and 8) also moot in view of the examiner's extended discussion as to why its obvious to ground electrode 24 of fig. 7 of Kato, and consequently why that electrode would be the positive electrode of the sensor regardless of whether the sensor is operating as an EMF sensor or as a limit current sensor (see further discussion of Logothetis).

Applicant's arguments concerning the use of Murase are also not persuasive. Applicant's argument appears to boil down to the fact that Murase does not set forth the benefits described in the claims of the instant invention (and consequently don't solve the problem identified by the applicant). However, said benefits appear to be a result of the set forth structure. Because the electrodes of Murase read on the claimed subject matter, the reference would appear to

inherently have the set forth benefits. The mere fact that the references relied on by the Patent and Trademark Office fail to evince an appreciation of the problem identified and solved by applicant is not, standing alone, conclusive evidence of the nonobviousness of the claimed subject matter. The references may suggest doing what an applicant has done even though workers in the art were ignorant of the existence of the problem.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (703) 305-0506. The examiner can normally be reached on Monday through Thursday from 8:00 AM-5:30 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner are unsuccessful, the examiner's supervisor, Mr. Robert Warden, can be reached at (703) 308-2920.

When filing a fax in Group 1700, please indicate in the header "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communications with the PTO that are not for entry into the file of this application. This will expedite processing of your papers. The fax number for this Group is (703) 305-7719.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, whose telephone number is (703) 308-0661.

Kaj K. Olsen, Ph.D.

Patent Examiner

AU 1744

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